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ARE THE MAYA HIEROGLYPHS PHONETIC?

BY CYRUS THOMAS.

The character of the writing found in the Maya codices and inscriptions has been, in the last few years, the subject of considerable discussion among the few scholars who are devoting attention to these aboriginal records; but the conclusions reached are widely different, some—as Drs. Förstemann, Schellhas, Seler, and Valentini—maintaining that the characters are ideographic and not phonetic, while others—as H. de Charencey, Leon de Rosny, and the present writer—believe them to be chiefly phonetic. Dr. Brinton takes a somewhat middle ground, holding that this script is in the nature of rebus-writing, which he terms “ikonomic.” If the interpretations here presented be accepted in whole or even in part, the question of phoneticism is settled.

There are reasons besides the direct test of decipherment for believing the writing to be, in part at least, phonetic. We have the positive statements of early Spanish writers to this effect, Landa supporting his assertion by giving what he declares are some of the letter elements of the glyphs and a full series of the day and month symbols. As the latter have been verified throughout by the codices and to some extent by the inscriptions, it would seem improbable that he was wholly in error in regard to the character of the writing. It appears, further, from a statement by Father Alonzo Ponce, quoted by Dr. Brinton,* that the missionaries learned to read and write them, and probably used them to impart instruction to the natives. A translation of his language is as follows:

They are noteworthy for three things among all those of New Spain : one, that in ancient times they had characters and letters with which were written their history and the ceremonies and order of the sacrifices to their idols, and their calendar, in books made of the bark of a certain tree, which were long strips a quarter or a third as wide, which were doubled and folded, and thus assumed somewhat the form of a book bound in quarto. These letters and characters were not understood save by the priests of the idols (called in that language *ahkines*) and some Indians of high position. In later times some of our priests understood and knew how to read them and also to write them.

* *Maya Chronicles*, p. 63.

The natural inference to be drawn from this language is that these characters were something more than mere conventional symbols.

The remarkably correct description of these codices given by Father Ponce, who had traveled in Mexico and was acquainted with the Aztec picture-writing, warrants us in assuming that he was correctly informed as to their character by the priests who had studied them; and, if so, there is little, if any, doubt that he understood them to be phonetic.

The failure hitherto to apply Landa's letter elements in the solution of the problem is not conclusive proof that they are wholly erroneous. Numerous reasons for such failure besides that of misconception or willful misrepresentation on the part of the old bishop may be given. One cause of failure to obtain favorable results has been the neglect of those attempting to use the alphabet to take into consideration the bishop's lack of artistic skill in drawing the characters. This neglect has perhaps been a more serious drawback than has been supposed. Take for example his second *l*, which, as it stands in his manuscript, will not be recognized in the codices, but if turned half-way round is seen to be a rough attempt to draw the symbol of the day *Ahau*, which forms the upper half of the symbol for *Likin*, "East." When thus correctly understood it begins to drop into place according to its given phonetic value. So with his second *x*, which, if the position is changed, will be recognized as a rude imitation of the upper part of the symbol for *Chikin*, "West," the same as the symbol for the day *Manik*. Here again the phonetic value is retained in the combination.

Another reason why efforts at decipherment have failed of success is the misconception of the peculiar character of the writing which Dr. Brinton, with clearer conception, evidently attempts to explain by his theory of "rebus-writing." This peculiarity is found in the fact that as it exists in the codices and inscriptions it is in a transition stage from the purely ideographic to the phonetic. I think, however, he has failed to give a complete explanation in neglecting to note the range in variety, and especially the nearer approach in part made to true sound writing. As it is not supposable that there was a sudden leap from the symbolic to the phonetic, it is presumable that the symbols would, so far as possible, be gradually given phonetic significance, in which process they would pass through the stage this author has aptly named "ikonomic." Had the Maya scribes at the time of the Conquest advanced beyond this stage?

I think they had, though it is not contended that the transition was completed, but in process. If this opinion be correct, we may expect to find an intermingling of conventional symbols and phonetic characters; but it is not supposable that the latter had reached that stage where each sound was indicated by a glyph or sign; nor is this method of forming a written language peculiar, as the derivation of the cuneiform or "wedge-shaped" writing from picture-writing has been traced through the archaic forms of the earlier Babylonian texts. "Like Egyptian hieroglyphics, the system included both the use of symbols standing for syllables, and also of the older ideographs or sketches of the object, used as determinatives to secure the right understanding of the combined syllables."^{*}

"Both cuneiform and hieroglyph trace their origin to picture-writing. The two systems developed independently five hundred characters: phonetic, ideographic, and determinative."[†]

It is therefore to be expected that examples of each of these stages of development will be found in the Maya writing. In fact, it is probable that the same character may be found in one place as phonetic and in another as retaining its symbolic significance. As an example, the symbol for the day *Kan* appears in many places to be used as a mere symbol for maize or the grain of maize; yet it is found in numerous combinations and relations where it cannot be considered a symbol with its usual meaning, but may be consistently rendered if considered phonetic. The same may be said of other symbols. If the writing be in any true sense phonetic, we may expect to find here, as in the primary stage of other written languages, several different signs for the same sound, which we find is true even in Landa's short and partial list.

The indications, so far as revealed by the study of the writings, are that, as a general rule, the consonant sounds are those represented by the characters; not that these glyphs are limited to these consonant elements, for this is seldom if ever true; but it appears that a character was selected to represent a certain sound or syllable because as a conventional symbol it was used to denote a word having a given consonant as its chief phonetic element.

Thus, for words or syllables in which *b* is the chief consonant sound, they made use of the conventional symbol for "footstep,"

* Conder, "Syrian Stone-lore," p. 15.

† *Ibid.*, p. 64.

“path,” “road,” because in their language *be* or *beil* expresses the meaning of this symbol, which is a circle with five inclosed dots (Pl. I, 2), the conventionalized form of the footprint. The subordinate elements, chiefly the vowel sounds, are often left to be supplied from the connection, or are indicated by certain marks or determinatives, though as yet but few of the latter have been ascertained. It is found, however, that the leading phonetic element indicated by the glyph is not always the initial sound of the word where this is a vowel. That some of the glyphs are genuine syllabic characters is also true. Thus the symbol shown in Pl. I, 8 (omitting the prefix) appears to have in most cases *cab* as its phonetic equivalent.

It is apparent to careful students that all the codices are formed substantially upon the same conventional plan, the widest variation being found in the Codex Peresianus. As a general rule, the pages are divided by cross-lines into two, three, or four divisions, and these are arranged into sections or chapters. Often a section extends partially or wholly across a single page; sometimes it continues to or over the next page or the two or three following pages. There is usually placed at the left of these sections or series one or more columns of day symbols, over which are the numerals to be attached to them according to the Maya system of numbering days. From these, running along to the right, usually immediately below the text, is a series of black and red numerals indicating certain days, as explained in my “Aids to the Study of the Maya Codices.”* The text is usually arranged in groups of four or six compound characters over a pair of numerals—one red, which gives the day number, and the other black, which forms the counter or denotes the interval. It is apparent from this arrangement that the text refers in some way to the dates indicated by the numerals, and this leads to the reasonable conclusion that these records are to a large extent only religious calendars; but, as the Mayas carried their religion into all their actions, we have in these codices allusions to most of their customs and industries. We must expect then to find here brief formulas, directions to be observed, and possibly notices of good and evil days on which to do certain work or perform certain acts.

This conclusion in regard to the subject-matter of the text is reached independently of the decipherment of the characters, by a

* 6th Ann. Rep. Bur. Eth., pp. 275-283.

study of the accompanying figures, the fact that time symbols are connected with each group, that there is often a repetition of characters in related groups, and that there is often a certain parallelism in the groups of a series so marked that the general subject of the series may be ascertained if but one or two characters are deciphered. Even without this it is often possible to decide what certain characters of the series refer to.

I have decided to occupy the space allowed me chiefly with examples of my interpretation of single compound characters in order to afford investigators a basis on which to work in testing my conclusions or in making further advance.*

Taking as a starting point Landa's second *b*, which has already been referred to, we will proceed step by step, basing what follows on that which precedes; not, however, without an occasional break in the chain. This *b* character, as given by Landa (Pl. I, 1), is a circle with four inclosed circular dots; in the codices it is always found with five interior dots, as Pl. I, 2; the four outer ones are sometimes placed against the surrounding circle, which is frequently double (Pl. I, 7). So far as ascertained, these differences in form do not appear to have any bearing on the phonetic value; possibly, however, it may yet be discovered that they serve to indicate the vowel elements.

In the lower line of Dres. 46c is the character shown in I, 3; also that shown in I, 4, each (omitting the numeral) used here as the symbol for the month *Kayab*. Although differing materially from Landa's symbol for the same month, which is not found in the codices, there can be no mistake as to their significance here, as is shown by tracing the series running through pages 46-50. Here, then, is one instance in which the *b* character appears where the word indicated has *b* as one of its leading consonant sounds. The right appendage to Pl. I, 4, which appears to have *u* as its chief phonetic element or equivalent, is probably used here as a month sign or determinative.

* The following abbreviations are used to economize space: Dres. = Dresden codex; Tro. = Codex Troano; Cort. = Cortesian codex. The numbers which follow these abbreviations indicate the page or plate of the codex mentioned. The small letter following a number—thus: Dres. 45b—denotes the transverse division of the page, the top one being indicated by *a*, the second by *b*, etc.; hence the example given is to be read Dresden codex, plate 45, second division.

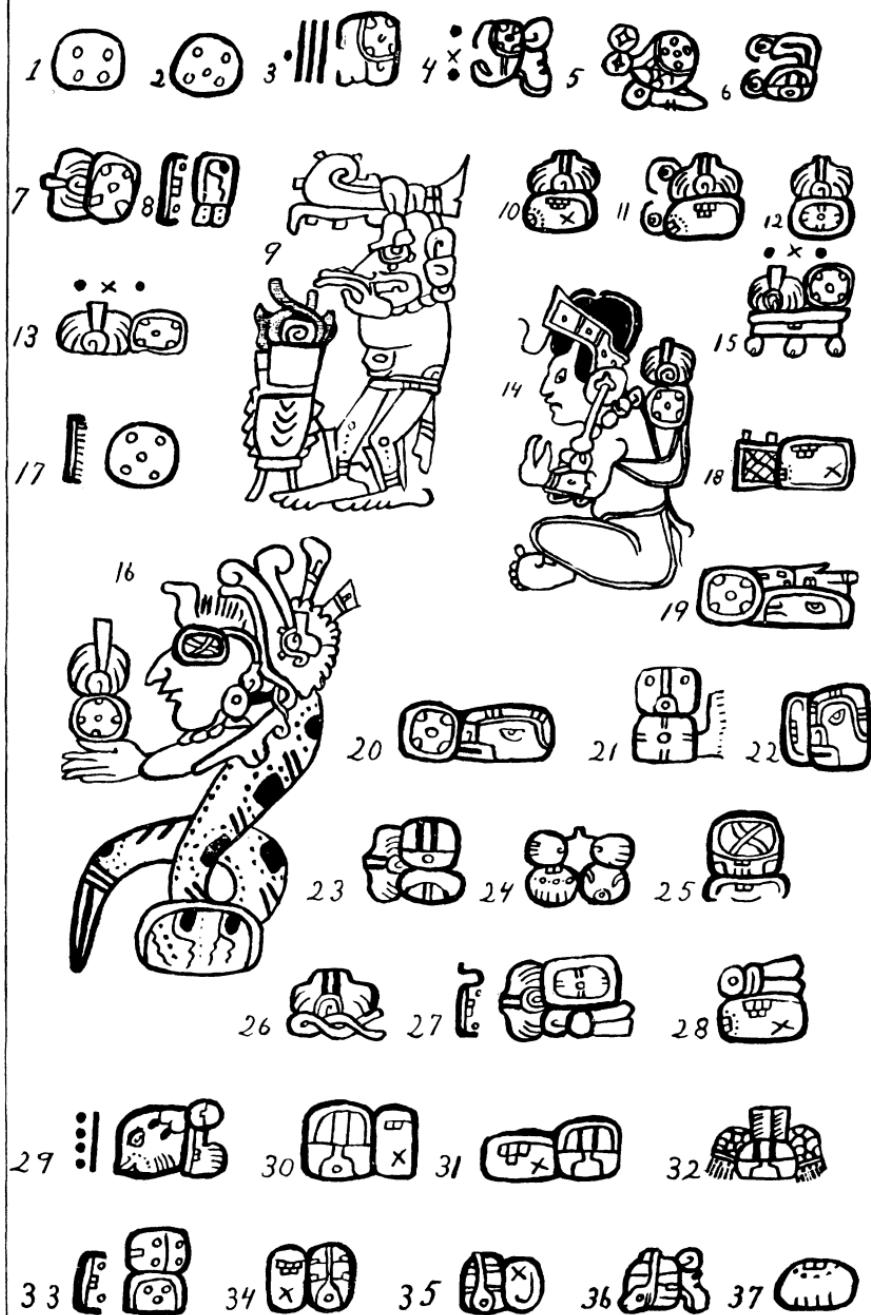
Landa's symbol for the month *Pop* (Pl. I, 5) has the *b* character as its chief element, indicating, if the name given be correct, a substitution of *b* for *p*. That this supposition is correct appears to be confirmed by the fact that the symbol for the same month, as found in Dres. 50b (Pl. I, 6), has, in place thereof, a quite different character, which we may safely assume has *p* or *pp* as its chief element. This change in the symbol used for a given month seems to furnish a strong indication of phoneticism. The circular prefixes in the latter, as also seen in I, 11, do not appear to be a part of the symbol; they may, as Dr. Seler suggests, denote twenty or, more likely, show that the month is complete. At any rate, they are only used with month symbols where the month is complete or follows one completed.*

In Tro. 3*b are the two characters shown in Pl. I, 7, 8. The left part of I, 7, is the same as the upper part of the symbol for the months *Yax* (I, 10, 11) and *Yaxkin* (I, 12) as given by Landa and as found on plate 48 of the Dresden codex. It may therefore be assumed that *y* is its chief phonetic element. This gives *y'b* as the consonant elements of I, 7, leaving the vowel sound or sounds to be supplied from the connection or from some indication or sign which has not been ascertained. As we are limited in our endeavor to ascertain the vowel elements to the connection in which the glyph is found, attention is called thereto: First, it is conceded that plates 1* to 10* of this codex relate to bee culture and the honey industry; second, the character which follows (Pl. I, 8) is supposed to be one symbol for "honey;" and, third, the picture below (I, 9) represents an individual before a vessel in which something is burning or melting. To this may be added the fact that the Maya word *yib*, which contains the consonant elements of our glyph, signifies "to melt, dissolve, liquefy, fuse," which is consistent with all the data.

The reasons for rendering Pl. I, 8, *cab* (*cabil*), "honey," are as follows: This glyph, omitting the prefix *u* and the appendage, is substantially the same as the symbol for the day *Caban*; but the same symbol † is used in places where it can have no other significance than "earth" or "soil," whether phonetic or not, and again to indicate "honey," also a "hive" or "bee-house," and in one

* This will be discussed more fully in another paper relating to the Maya time symbols.

† Thomas: Study of the Manuscript Troano, pp. 149-151.



or two places where the only seemingly applicable signification is "low," or "at the surface of," or "near the ground." Now it happens that the word *cab* has all these significations, and hence if the symbol is phonetic it may also have as many different meanings. This variety in the signification of a glyph, shown by its use, would seem to be another evidence of phoneticism, as it is difficult to explain it on the theory of being simply symbolic. We therefore translate our two characters (I, 7, and I, 8) *yib u-cab*, "melt the honey."

The compound character shown in I, 13, is found in the lower division of Dres. 18 and 19. Although it contains the same characters as those of the compound symbol I, 7, which we have interpreted by *yib*, "to melt," etc., it is apparent from the connection in which it is found that it has some other signification here, for it appears to indicate something which can be borne on the back, as in each case the figure below the text shows a female bearing the same combination on her back (Pl. I, 14). It can be carried in the hand (Dres. 18a) and placed on a dish or platter (I, 15). As *yib* (or *yd*) also signifies "a bean, or pulse," we may assume that this is the signification intended here. The two dots and little cross accompanying this symbol (Pl. I, 13, and I, 15, and the example in Dres. 18a) show that this character has a different signification from I, 7; they probably form a determinative indicating something which may be counted, as we find the same marks in one or two instances in the Dresden codex joined to month symbols to denote date. Although these are not found with the symbols on the back of the females in Dres. 18c and 19c, this was probably deemed unnecessary by the aboriginal scribe, as they are given with the same symbols in the text. In Dres. 18a, where the symbol in the woman's hand is accompanied with the dots and cross, it is probable there was no symbol in the text; none appears in the unobliterated portion.

In the hand of the personage shown in Pl. I, 16, from the lower division of Cort. 32, we observe a compound symbol composed of the same characters as seen in I, 7, and I, 13, but here without the dots and cross. The consonant elements of the word indicated, supposing the glyph to be phonetic, must, according to what has been advanced, be *y'b*. What is the word? Neither of the definitions given above appears to be appropriate here. There is not sufficient difference in form to suppose that the vowel sounds are in-

dicated thereby. The figure and connection furnish the only aids in supplying them. The serpent, as we know, and as is made very apparent in the codices, is a symbol of moisture; the cross seen in the eye of the human head is also a symbol of moisture and of the winds. The serpent appears to be rising out of something denoted by the *cab* symbol, doubtless "earth" or "ground" here. These indications suggest that the figure relates to moisture. As the Maya word *yeeb* (or *yeb*) signifies "mist, small rain, dew, humidity, moisture," and furnishes the phonetic elements required by the symbol, this is probably what is indicated by it.

Pl. I, 17, 18, are copies of two compound characters from Tro. 12b*. The figure below the text represents an individual apparently marking or painting stripes on the head of an idol.

It is also noticeable that the idol head in the right half of Tro. 12b* has three stripes on it, while that in the left half has but two, indicating that it was the intention of the artist to show by these figures the workers in the act of forming these stripes. The prefix in I, 17, is Landa's *ca*, "two, twice," etc. As *bon* (*bonah*) signifies "to paint, dye, tinge, stain," and contains *b* as its chief phonetic element, "paint twice" or "paint two" may be assumed as a reasonable interpretation of the whole character. As I, 18, follows it to the right, its interpretation must agree with that giving the preceding one. As the cross-hatching is found in the symbol for the day *Chicchan* (Pl. III, 11), and also in that for the month *Pax*, we may assume that it denotes the sound *x* (sh) or *ch* (soft). The right half, as will hereafter appear, is used for more than one sound, among them *che*, "wood." As *xelche* signifies "a groove or crack," we may interpret the two, "paint the two grooves in the wood."

Pl. I, 19, (Tro. 31d) may be translated *bulni* (*bulahni*), "to choke, smother, drown." In this the character above the face with a minute parallelogram and two circular dots in it is the *l* symbol. From a careful study of Landa's *l*'s as given in his list, and his example of spelling *le*, and of the similar characters in the codices, it is apparent that both his *l* characters are derived from the same original form, the little parallelogram and two interior dots being the essential features. This original form is probably seen in the symbol for the day *Ahau*, which is the same character

* Compare Tro. 31c, where the priests are painting their oratories or idol seats.

as the upper part of the symbol for *Likin*, "East" (Pl. I, 21). The face character of I, 19, is shown more fully in I, 20, which, according to the interpretation given the former, has *n* as its chief phonetic element. This is obtained by referring to our Pl. I, 22, which must be the symbol for *Nohol*, "South," or *Xaman*, "North." Following these indications we may render I, 20, which is found in immediate connection with I, 19, by *ban* (*banah*), "to demolish, throw down, level with the ground." As the long-nosed god (the Maya *Tlaloc*?) is seen below, overturning a jar of water on the sprouting corn, bending it down to the ground, the appropriateness of this interpretation is manifest.

So far the *y* symbol has been found retaining its phonetic value in some five or six different places, two of the instances being in month symbols. It may therefore be used with this value with reasonable confidence.

In the right-hand section of Dres. 41b is the glyph shown in Pl. I, 23, which we translate *yulpolic*, from *yulpol*, "to smooth or plane wood," or (as given by Henderson) "to smooth, plane, or square timber, to beat off the log." The *p* character shown in I, 6, retains here its phonetic value. By reference to the figure below the text we see an individual in the act of chipping off the side of a tree, which agrees exactly with the interpretation given the symbol. This he appears to be doing by holding in his left hand an instrument resembling a frow, which he strikes with a hatchet. The character immediately below the one given (Pl. I, 24), which we interpret *mamachah*, "to make flat by repeated strokes," appears to give further confirmation of the explanation of the picture. The phonetic value given the parts of this compound character is obtained in this way. The upper character with two wings is Landa's *ma*, except that the circular wings contain the lines or strokes which the bishop has omitted and which appear to indicate the *m* sound. The left of the two lower characters is substantially the same as the symbol for the day *Ymix*, in which *m* is the chief phonetic element, and is the same as the symbol for the month *Mac* (Dres. 49c), omitting the *ca* glyph (Pl. II, 2). The lower right-hand character is the symbol for the day *Chuen*. We thus obtain legitimately the sounds *ma-ma-ch'*.

The characters shown in I, 25, and I, 26, which follow each other in the order given (Dres. 56b), may, with strong probability of being correct, be rendered *zuy*, "the whirlwind," and *ya'*,

"to twist" (Henderson). The cross in the chief character of I, 25, appears, as a general rule, to be that which is used for *z*, but there is a slight variation in the form, which changes it to *z*. One form is seen in the lower part of Landa's symbol for the month *Zip*; another in that for the day *Ezanab*. The *z* of this author's letter list is a different character, which will be shown hereafter. The suffix of I, 25 appears to be a determinative to indicate the vowel sound *u*, as it varies slightly from the form of this letter when used as a prefix. The lower character in I, 26 is presumed to be a fanciful form of the cross or (2) symbol. As the preceding characters in the same group appear to relate to wind and storm, the interpretation given would seem to be appropriate.

The compound symbol shown in Pl. I, 27 (Dres. 6ob) is connected with an important series, which, judging by the figures above and below, relates to the close of one time cycle and the commencement of another. If this opinion, the reasons for which cannot be given here, be correct, the text must relate to time. As the two chief characters in this compound glyph form the symbol for the month *Yaxkin* (Pl. I, 12) and the lower right-hand character is the same as the upper part of the symbol for the month *Zac*, Dres. 46b and c (I, 28), the whole may be translated *u-yax-kintzil*, "the first or new hour." In the column to the right, same division, is the figure shown in I, 29, but probably does not follow immediately after I, 27, as the text here appears to be read by columns. This we venture with considerable doubt to translate *9-Xul-thib*, "nine, close or end, appears," that is, "the end of the ninth (cycle?) is at hand." The face symbol is the same as that for the month *Xul* as given in this codex (plate 46b and 61, at bottom). The right-hand character appears to have *th* or *t* as its phonetic equivalent. If this interpretation be correct it will conflict with the attempts which have so far been made to fit the Maya Katunes with the Gregorian calendar, or throw the date of this codex back fully two centuries preceding the Spanish conquest, which is not probable. Nevertheless I have ventured to give what appears to be the phonetic value of the symbols.

The compound characters shown in Pl. I, 30, and I, 31 are from divisions *a* and *b* of Tro. 31, which undoubtedly relate to the planting of seed, most probably maize, as appears to be indicated by the number dropping from the hand of the planter. The first of these, I, 30, from division *a*, we must, if we retain the values

given the parts (Pl. I, 6, and I, 23, for the first; and I, 10, and I, 28, for the second part), translate *p'k* or *p'c*. As *pak* signifies "to sow seed, to plant," we obtain a phonetic value which agrees exactly with what is shown in the figure below the text. As I, 31, contains the same characters in reverse order, it is presumable that the phonetic equivalents are also reversed; this, however, does not necessarily follow, as will hereafter appear. This will give *k'p* or *c'p*, which may be *cap*, "to place in holes or fissures; to introduce," or *capak*, "to resow or seed the second time," or *kap*, the same signification as *cap*. Either is appropriate, if we are to judge by the figures below the text.

Pl. I 32, is the head-covering of the individuals in the above-mentioned divisions of Tro. 31. In this is seen our *p* glyph apparently introduced as a phonetic character; if so, it may probably be correctly translated *ppoc*, "the sombrero or hat." It will be noticed that here we have the double (*pp*), while in the preceding examples the single *p* was used. So far I have found no fixed rule by which to distinguish these phonetic elements from one another, though Landa gives different characters for the *p* sound, and I find different ones in the codices. It is possible, and, so far as yet ascertained, seems probable, that the phonetic equivalents indicated by the scribes do not always accord with those given in the lexicons.

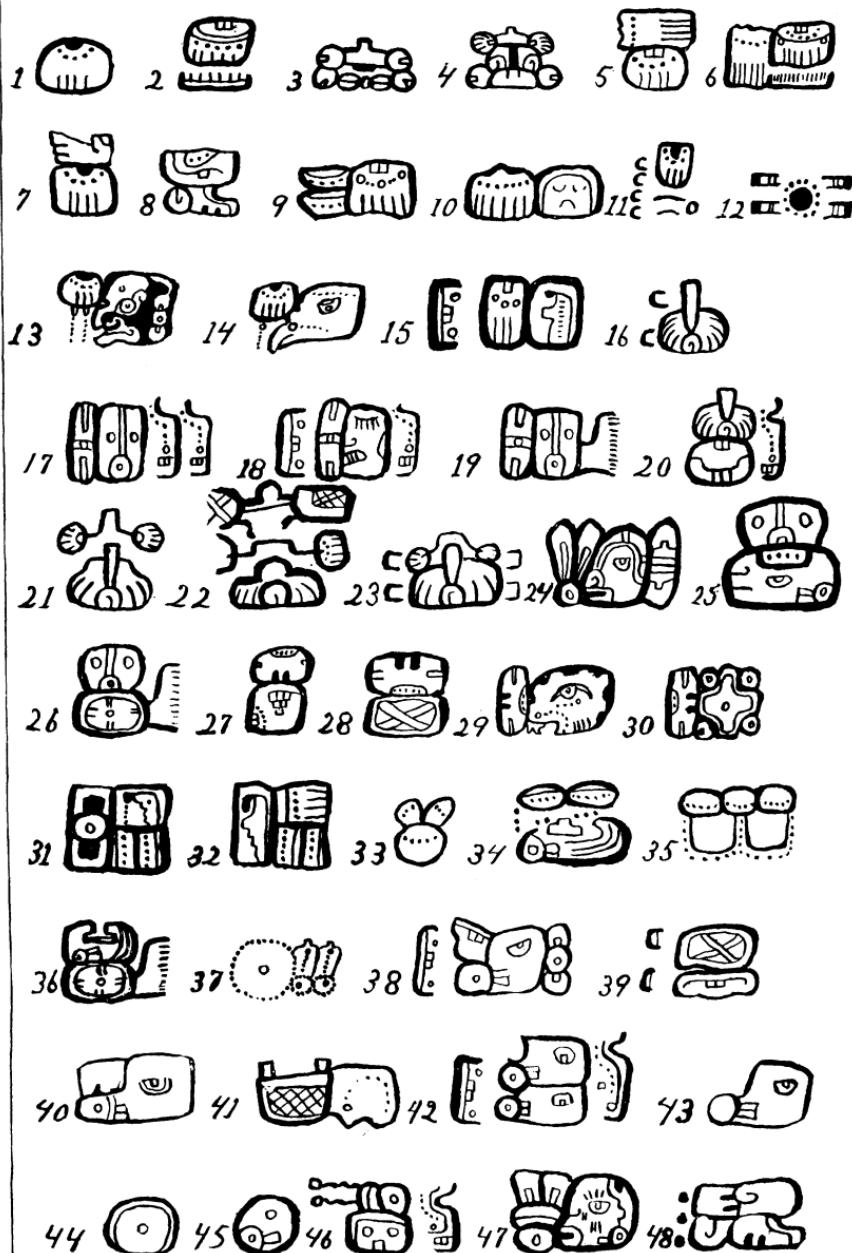
In Pl. I, 33 (from Tro. 22*a) is seen (omitting the prefix) substantially the symbol that Landa interprets *le*, "the lasso," and also "to lasso." As the upper character is the same as the left portion of the upper character in Pl. I, 19, and the lower portion is the same as Landa's *e*, we translate the whole glyph by *u-le*, "the lasso," or "snare" or "to snare." As this is followed by the symbol shown in I, 34, signifying *kutz* (or *cutz*), "the turkey," and the figure below the text shows a snared turkey, the interpretation appears to be appropriate. In this, the first or left-hand character is the same as that seen in Pl. I, 28, 30, and 31, and is given the same phonetic value. Turning to Dres. 1c we notice in the figure below the text the compound glyph shown in I, 35, except that in the figure it is turned on its side. Immediately below it is seen the figure of a fish which the two individuals represented are trying to catch with a seine. As this contains the same elements as I, 34, reversed, the phonetic value should be *tz'c*. Referring to Perez's lexicon we find that *tzac* is a little fish "so named;" Brasseur says

a little fish "resembling a sardine, which inhabits the senotes." This evidence furnishes a very strong indication that the characters are phonetic and that the interpretation given is correct; nevertheless we encounter a difficulty in tracing the use of the character (first of Pl. I, 35, and last of I, 34), which has *tz* as its chief phonetic element. This is found in the fact that in Dres. 48c substantially the same glyph (Pl. I, 36) is given as the symbol for the month *Kankin*. That the suffix or appendage is the month determinative or sign appears to be evident from the number of times it is found connected with month symbols and the fact that *u* is its chief phonetic element. No attempt to explain the difficulty presented by the last-mentioned symbol will now be made, though attention is called to the fact that other months are denoted by more than one symbol.

We turn to another series. In Pl. I, 37, is seen the symbol for the day *Ymix*, frequently varied in the upper part, as shown in Pl. II, 1. As *m* is the chief consonant element in the name of the day, we assume that this is the chief phonetic element of the character. As Landa's *m* differs so materially that it cannot be assumed to be the same character, and moreover does not occur in a recognizable form in the codices, we obtain no evidence therefrom to sustain our assumption. We must therefore depend upon the result obtained by tracing it through the various combinations in which it is found.

Referring to Dres. 50c, we find the character shown in II, 2, used as the symbol for the month *Mac*. As this varies from the conventional form and is followed or preceded by Landa's symbol for *ca* (prefixes are often placed below), it is possible it should be rendered *Camach* or *Camaach*, "Jaw" or "Jaws," the true or full name of the month. This would seem to indicate that the double cross-line in the upper glyph denotes *c*. Landa's symbol for this month is shown in II, 3, and a similar symbol for the same month from the lower line of Dres. 69 in II, 4. The upper portion in both is evidently this author's symbol for *ma*, though in the codices the little circles at the ends have the parallel strokes usual in the *m* character. As we find two different characters, both containing the *m* element, used to denote this month, is there not in this fact a strong proof of phoneticism?

Pl. II, 5, found on Cort. 27 a, Tro. 14b, and II, 6, from Dres. 29b, appear to be correctly interpreted by *xamach*, "a vessel,



large earthen pot." The connection in which it is found on plate 27 of the Cortesian codex shows that it denotes a vessel, whether phonetic or not, if we are to suppose the text has any relation to the figures below it.

Pl. II, 7 (from Tro. 17c) is probably to be interpreted by *chim* (*chimil*), "a bag, sack, a kind of net." Henderson also gives *x-much*, "a net." The object referred to is seen in the figure below the text, where it forms the net-like covering of the image head in the vessel. The latter has probably been placed here to be steamed in order to make the wood more workable. This suggestion appears to be confirmed by the accompanying symbol (II, 8), which, in a communication to *Science*,* I translated *kal*, "to imprison, close, shut in," but which should more likely be rendered by *keluc*, "to sweat." This interpretation is suggested by the subsequent discovery that the appendage has *u* as its chief phonetic element. As is now well known, the chief character of this glyph is the symbol for *zo*, or *kal*. The upper character in II, 7, appears to be an imperfect figure of the upper character of the symbol for *Chikin*, "West" (II, 36).

The character shown in II, 9 (from Tro. 31*b) we translate *zum* or *zuum*, "rope, cord, line;" and II, 10, which follows in the same group, may be appropriately rendered by *xel*, or rather *xelem*, "to part, separate, divide, apportion." As the first part of the latter is the same as the first part of II, 5, we obtain as its phonetic value *x'* (sh), apparently accompanied by *m* as a subordinate sound. If this supposition be correct, we have reason for believing that the parallel strokes indicate the presence of the *m* sound. However, we shall soon find an instance where the upper, dot-surrounded portion alone of the *m* character appears to indicate this sound.

The next example (Pl. II, 11, from Cort. 11b) brings before us the little hooks which Brasseur, on what authority is not known, has added to Landa's letter list, and which he justifiably asserts are signs of aspiration, or the *h* sound. As they are doubled in the example here given, the character may be interpreted by *hahaymuc*, "to bury, or inter superficially;" also "a stab, or thrust given obliquely." The first definition applies very well to the act of planting corn, shown in the figure below the text. The second agrees equally well with the idea of dibbling holes in the ground with the

curved stick the planter holds in his hand. The two little lines and dot below the character may possibly denote the *uc*, as this is the terminal syllable of *buluc*, "eleven," and two lines and a dot form the symbol for this number.

The character (Pl. II, 12, from Cort. 20 b) is the one above referred to, in which we have reason to believe the *m* symbol is reduced to the dot-surrounded portion alone, as *hamah*, "to make a breach in a rampart, to break down or break open," or *hemeh*, "to lay a beam across a place, to traverse," appears to furnish an appropriate rendering. The evidence which seems to justify this rendering is found in the figures below the text. Attention is also called to the fact that the sign of aspiration precedes and follows the central character and *h* begins and ends the word.

The glyph shown in Pl. II, 13 is found in Dres. 14b and c, and also 46b. In each case a dark male figure is seen below the text to which it undoubtedly refers, different, however, from that which in a former publication I assumed to be *Ekchuah*, the god of merchants and traders. The phonetic equivalent of the upper character appears to be *maax*, "monkey, ape, imitator." The face character is probably a determinative symbol. Brasseur, under *Akab-Max*, speaks of a phantom or hobgoblin of this name which he says signified "the great monkey of the night." The upper character in II, 14 (Dres. 35c), which is substantially the same as the preceding, we render by *maach*, "the crow." The bird head is probably also a determinative symbol. In this instance nothing is seen in the figure below to confirm this interpretation.

The compound character (Pl. II, 15) is found in Tro. 9*b and 10*c. It occurs in the latter twice, the parts, however, reversed in the parallel groups, while in that of 9*b one part is placed above another. These variations do not necessarily indicate a difference in the phonetic value, as can readily be ascertained by comparing characters in the numerous parallel groups found in the codices. Omitting the prefix *u*, this may be rendered *mak-cab*, "to eat honey without chewing (that is, by sucking); to break into a bee-hive and steal the honey." As the parts *mak* and *cab* have the same signification when separate, the reversal of the parts in this instance has no bearing on the interpretation. It may be remarked that the verb *mak* is a word of several meanings. By reference to the plates of the Tro. codex on which the symbols are found, the appropriateness of this rendering will be apparent, if I rightly interpret the figures

below the text. There we see the twisted red symbols denoting the fire kindled beneath the hives or bee-houses by which to drive out or destroy the busy little workers. In one of the fires we observe bone symbols, probably indicating a method of giving to the smoke an unpleasant odor, as rags were formerly used in some sections of our own country for the same purpose.

As the symbol having *y* as its chief phonetic element has been shown in Pl. I, 7, “*yib*;” I, 10, “*yax*,” and I, 12, “*yaxkin*,” some additional characters containing it are presented. Pl. II, 16, from Cort. 24b, may, according to the definitions heretofore given the parts, be translated *hayah*, a word having two significations—“to stretch, extending, to stretch on a level surface,” and “to demolish edifices.” Judging by the figures below the text and the interpretations given to other characters found in the same series (II, 17, 18, 19), it has here the latter signification. In the middle division of this plate and of plate 25 we see what we take to be a series of inclosed graves or sepulchers, the inclosures or vaults being of wood fastened by thongs or withes. The dead are seen within, but on the top of each is a person stooping or lying down. This might be supposed to represent persons bewailing the loss of loved ones, but the text tells a different story. That shown in II, 17, we translate *paalaahal*, from *pablaahal*, “to rip open, unseam; to cut, break, or burst open.” The second (II, 18) is rendered by *u paa-cimilhi*, “the inclosures of the dead.” The third (II, 19) is probably *paatal* or some other derivative of *paaxal*, “to be broken open, ruined, depopulated.” If this interpretation be substantially correct it shows us one ugly phase of Maya warfare. It is worthy of notice that the *p* character which forms the first part of the compound symbols is similar to Landa’s second *p*, or rather his *pp*, though, like other symbols, turned half-way round. It may be remarked that the article in the hands of the middle figure of plate 25 is similar to those in the hands of the individuals in Tro. 23c, where they appear to be used in severing the trunks of trees. Although odd-shaped instruments to be used for this purpose, I have supposed them to be what may be termed saws, fitted with flint teeth. At any rate, they seem to have been used in some way in working wood.

The character shown in II, 20 (Cort. 11b), belongs to and immediately precedes the character shown in II, 11. Our interpretation is *ynah (kan)*, “sow or plant seed,” or literally “take to sow.” The *kan* character is here in all probability the conven-

tional symbol for grain or grains of maize. The meaning of the two symbols taken together is "plant the grain of maize, covering but slightly," or "in holes made by oblique thrusts." *Inah* is the more modern form of the verb, interpreted "to plant."

Characters II, 21 and 22: Notwithstanding the confident interpretation given these characters in *Science*, October 7, 1892, further study of them leads me to doubt its correctness. It is possible Rosny's assignment of the North and South cardinal point symbols is correct. This, however, does not change the value of the *ma* and *y* symbols. In Tro. 13**d*, Cort. 3*b*, and elsewhere the symbol for the same cardinal point is given as shown in II, 23. According to the characters, this may be rendered *ma-hayah*, "not extended or stretched out." See what is said above in regard to glyph II, 16.

In the lower division of Tro. 4 is the figure of a man, with a pack strapped upon his back and a staff in his hand. We may safely assume that this represents one of the Maya traveling merchants. On the ground in front of him are foot-prints indicative of the journey he is commencing. The text above consists only of the two compound characters shown in II, 24, and II, 25. The first consists of three elements or characters: that to the left being substantially the same as the upper part of I, 28—*zac*; the middle or chief one the same as the *n* symbol in I, 20, and the right appendix Landa's *h*, we obtain *zinah*, "to stretch, extend; to halter, bind or lash with cords." The latter definition seems, to be an appropriate rendering. The second (II, 25) we render *lechcabil* (or *lechcaltah*), "carried resting upon the shoulders, passing behind the neck." The upper character, which has *l* as its chief phonetic element, is the same as the upper character in the symbol for *Likin*, "East," shown in II, 26. Landa's second *l*, if turned half round, is seen to be a poor drawing of this character. The inclosed dotted line in the lower glyph leads me to the supposition that *e* is the following vowel element. However, without stopping now to give the reason for this belief, I may add that the two compound characters (II, 24, and II, 25) taken together may be rendered, "bind tightly (the package) behind the shoulders on the back of the neck." The surrounding day and numeral symbols indicate the lucky dates on which traveling merchants may start upon a journey.

Pl. II, 27 (Dres. 49*c*), denotes the month *Ceh*. It is the same as Landa's symbol minus the month determinative. It is apparent,

from the fact that the lower character of this symbol is also found in the symbols for *Yax* and *Zac*, that the word *Ceh*, if the writing is phonetic, does not give the exact phonetic equivalent. Henderson gives both *Ceh* and *Kez* as the name of the month and the Maya word for "deer." The difficulty of making this harmonize with the symbol for the month *Zip*, shown in II, 28, which, according to the value given the parts, should be *Kez* or *Ek'z* or *z*, will be referred to hereafter; at present our reference is only to the first or upper character in II, 27, which appears to have *k* or *ke* or *ek* (c hard) as its chief phonetic element. We see here the inclosed dotted line above referred to, which seems to indicate *e* as the vowel element.

The character shown in Pl. II, 29 (from Dres. 8a), appears to be the symbol used to indicate the so-called Central American tiger, probably the jaguar. This is inferred from the fact that the figure below the text at this point and Tro. 17c is a tiger-like animal. In the latter group, however, the prefix to the glyph is wanting. Leon de Rosny appears to be justified in his interpretation *ekbalam*, "the tiger," although given by him without having reached any conclusion as to the phonetic value of the prefix. The face character is probably a mere conventional symbol used to denote the tiger.

Running through the lower division of plates 46, 47, 49, and 50 of the Dresden codex is a line consisting of repetitions of the character shown in II, 30. Here we have again our *k*, *ke*, or *ek* symbol. The right portion of the glyph bears a strong resemblance to some of the forms of the symbol of the day *Lamat*, and is so interpreted by Brasseur and Leon de Rosny. As *ek* signifies "star" and *lemba* "resplendent, bright, sparkling," the phonetic value of the glyph is probably "the bright, shining star," alluding to Venus. According to Henderson, *eekil*, *ekil*, or *yekil* was used especially to designate this star, *zaztal* being added to name it as a "morning star." As I have elsewhere intimated,* it is possible that Dr. Förstemann is right in supposing that the long numeral series running through plates 46-50 of this codex relates to the apparent revolution of the planet Venus.

The characters shown in II, 31, and II, 32, are from the upper part of Cort. 22, which is supposed to be the right half of the so-called "title page" of the Troano codex. By following the line

* *Science*, May 10, 1892, pp. 129-130.

in which these characters are found, through the two pages beginning at the left of the plate of the Tro. codex, the result appears to be as follows, giving the signification of the characters so far as known: first the four cardinal points in one direction, then two unknown glyphs, next the cardinal points in the opposite direction, after which follow the two characters shown in Pl. II, 31, 32. As the right half of II, 31, is, according to our interpretation of I, 8, and II, 15, *cab* or *cabil*, the whole of the compound character will probably be appropriately rendered by *yokcabil* (or *okcabil*, the *y* being simply euphonic), "above the earth," or, as Henderson, who gives two words of this form, interprets the first, "over, above the earth, above." The glyph II, 32, has *cab* or *cabil*, which signifies, among other things, "low, below, beneath," as its first element. The upper right-hand portion appears to be our *x'm* heretofore mentioned. It is therefore possible that *cabnix*, "a stair," "downward," given by Henderson, furnishes the phonetic equivalent of the compound character. This appears to be formed from *cabal*, "below, beneath," and *nix*, "to overthrow, turn over, throw down." These six directions, according to Dr. J. W. Fewkes,* were noted by the Tusayan Indians in some of their religious ceremonies. It seems probable, therefore, that the interpretation given the above-mentioned characters is correct as well as consistent with the phonetic value given to their separate parts.

Plate II, 33, is the *ku* of Landa's list. This, as usual with this author's figures, is a very rude imitation of what is intended. Our figure II, 34, represents this character in combination with another. The latter is imperfect, being partly obliterated, yet there can be no doubt that it is the same as the upper part of II, 36, the symbol for *Chikin*, "West." If the latter be phonetic, the upper part must have *ch'* as its chief phonetic element, as we know from I, 12, and II, 26, that the lower part is to be interpreted by *kin*. We therefore give as the phonetic equivalent of II, 33, *kuch*, which, according to Brasseur, is "a bird of prey, a kind of sopilote or vulture." As a strong confirmation of this rendering, the picture below the text represents a vulture eating a deer. A similar character is found in Dres. 13c, and in this case also the figure of a vulture-like bird below. Pl. II, 35, which duplicates the *ku* symbol, may be translated *kukuitz*, which, according to Brasseur, is the name of a bird

*Jour. Am. Eth. and Arch., II, p. 38.

identical with the *quetzal*. In the figure below the text is a bird perched on the shoulders of a woman—a figure that, judging by the head crest and long tail-feathers, may be accepted as an attempt to represent the royal bird alluded to.

Pl. II, 37 (from Dres. 16c), judging by the evident parallelism of the groups in this division, is the symbol of the bird pictured below the text. In this picture is easily recognized the head of the parrot. As *moo* is the Maya name of a species of parrot ("the macaw"), and the circular character of our glyph is like the symbol for *Muluc*, except that the circumscribing line is of dots, we may safely accept this term as the phonetic value. The fact that the small character is doubled, as is the *o* in the word, is another indication that the rendering is correct.

The character shown in Pl. II, 38 (Dres. 45b and c), apparently refers to the act of sewing or stitching indicated by the pictures below the text; and the little circle with two minute loops, in the left portion of the chief character, indicates the presence of *c* or *ch*. It is probable, therefore, that (omitting the *u* character) it may be correctly rendered by *chuyah*, "to sew," or some derivative thereof. This interpretation is rendered probable both by the scene pictured below the text and by the character which follows the preceding in five of the groups. This is shown in II, 39, and, according to the phonetic value given the parts, should be rendered by *Hus*, "to approach, draw near, join one thing to another," sometimes signifying carnal union (see Dres. 21c and 23c). Here, however, the signification appears to be to join the parts of cloth or other material by sewing. The little appendage projecting from the left of the main character of II, 38, is probably a determinative, possibly indicating that *u* is the vowel element; this, however, I am as yet unable to decide satisfactorily. The sub-appendage to II, 39, as has heretofore been stated (see explanation of I, 25) indicates that *u* is the vowel element.

Following up the clue gained from the glyph shown in II, 38, we present another containing the same character as its chief element. This, which is found in Tro. 35b, is presented in II, 40. It may be rendered by the Maya word *hoch*, or *hooch*, which, according to Henderson, has several different meanings—as a noun, "corn in general, cereals, harvest;" as a verb, "to gather corn from the stalk," "to empty or evacuate, to clean the pot," "to prepare to paint." It is probably used in the last sense in the

place referred to, as we see persons in the pictures below the text apparently rubbing something between their hands over a vessel. The character which follows it in the text (II, 41) has as its first part the character which forms the first part of I, 18, translated *xelche*. According to this, the chief phonetic element of this part must be *x*' or *ch* (soft). I find as yet no satisfactory clue to the second or right character; as *xak* (*xakil*) signifies "to mix ingredients" and *cahcal* "decoction, mordant preparation to dyeing," it is probable that they suggest the meaning.

The glyph figured in Pl. II, 42 (from Tro. 11c), is a duplication of II, 38, with the suffix which as in II, 17, 18, and 20, has *ah*, *ha*, or *hal* as its phonetic equivalent. We have, therefore, as the phonetic elements (omitting the prefix) *ch'ch'-ah*. As *choch* (*chochah*), Perez, and *chooch* (*choochah*), Henderson, signify "to loosen, untie, disunite, detach," we may accept this as the translation. If this interpretation be substantially correct, it follows that the chief phonetic element of II, 43, is *ch'*, probably *cho'* or *chu'*. As the little circle and loops in the left side form the chief feature of the character, they must have *ch'* or *c'* as their principal phonetic element. It is to be observed that we find the circle and loops in the upper part of the symbol for West (*Chi*), II, 36; also in the lower part of II, 25, where *ch* is one of the phonetic elements. It is also worthy of notice in this connection that although the symbol for the day *Muluc* is usually given as shown in II, 44, yet it appears once (Cort. 30b) as represented in II, 45. The symbol for the day *Manik* may possibly be explained as an abbreviation in which only the character having *k*, *c*, or *ch* as its chief element is given.

The character shown in II, 46, which belongs to the same group as II, 42, and immediately precedes it, appears to be satisfactorily rendered by *tholtah*, from *thol*, "to slice, to cut in pieces as one does a melon." The females figured below the text seem to be hacking or slicing fiber or some material which other figures on the same plate show is to be used in making cord or thread.

In order to illustrate the complete group just referred to, which consists of four glyphs (two have been shown in II, 42 and 46), the other two are presented in II, 47, and II, 48, and a copy of the figure below the text is given in III, 1. It can readily be shown that the face character of II, 47, signifies woman or female, whether phonetic or not. The prefix is phonetic, having *z* as its chief element. The strokes in the face character, which

are seldom seen in the "woman" symbol in the Dresden codex, may indicate the *m* or *n* sound in the phonetic equivalent, possibly *eznab*, "mother" (Henderson), or *zen-Chuplal*, "the great, grand, or noted woman," alluding to some mythological character represented, or female holding position. As a very general rule, the male figures represent mythological characters, the mask worn by the priest or actor indicating the particular deity referred to. Though this is not generally true in regard to the female figures, yet there are some which are apparently intended to denote female deities or females designated to perform certain religious duties, as in the case under consideration. The same symbol and similar female figures are found in Tro. 5*c, 6*b.

The last of the group (Pl. II, 48) is a character occurring very frequently in all the codices and which, as yet, I am unable to decipher satisfactorily. The prefix is *z* or *ox*, the main character is like the symbol for the day *oc*, and the suffix has *u* as its chief phonetic element. In many places "repeat three times" gives an appropriate rendering, (Henderson gives *lic*, "time, occasion," as *hun-lic*, "one time"), but there are other places where this definition does not appear to be applicable.

In the division referred to there are four groups, each of four compound characters which may be represented by letters—thus:

a	b	a	b	a	b	a	b
c	d	e	f	g	h	i	

In this *a* is our Pl. II, 46; *b* our II, 42; *c* our II, 47, and *d* our II, 48. As the characters indicated by the same letter are similar, it will be seen that the variations in the signification of the groups is expressed by the last two characters of a group. The *e* indicates the supposed bread symbol; *f* the supposed symbol of the Death God, and *g* the *Cimi* glyph; *h* the symbol of Dr. Schellhas' "God with the old man's face," and *i* a character which I am inclined to believe has the phonetic value *cilich*, "holy." As these terminal characters and a few others are of very frequent occurrence, is it not probable that we are to find therein reference to particular deities who rule the day noted or in whose name the action indicated is to be performed? The manner in which the character of the days is indicated as shown in the calendar given in the appendix to Stephens' "Yucatan," Vol. I, may, and I am inclined to think does, suggest the nature of these groups. If this supposition be

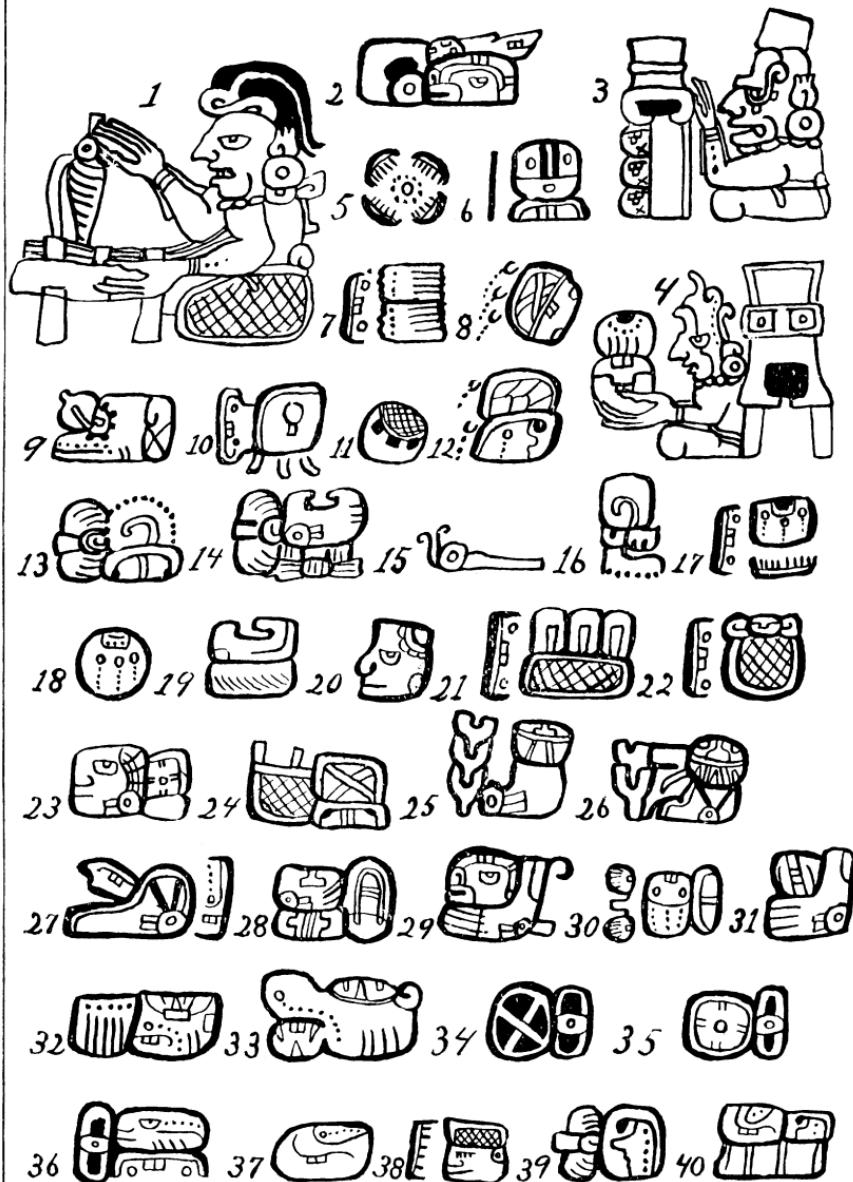
correct, we cannot expect to find aid in testing the correctness of our interpretations by connection in the subject-matter. When such expressions as "good ; the second day of rain ; the burner extinguishes the fire ;" "bad ; the tax on children falls due ; there is sickness," etc., are used to indicate the character of the day in a calendar which appears to be a survival of these ancient codices, we have good reason for supposing that the writing in the latter is substantially of the same character.

The character shown in Pl. III, 2, from Tro. 3rd, brings together some of the features shown in I, 19, and II, 40. Following the interpretation given the latter, the phonetic equivalent of the former must contain as its chief elements *h'* or *oh'*, *l'n* or *laan'*. As one definition of *hoclaantah*, "to pull up by the roots," expresses what appears to be the signification of the picture below, we may accept it as correct. This picture represents birds attacking a sitting figure, which we have elsewhere shown is probably intended to represent growing maize.*

It may be safely assumed, if we judge by the figures, that the upper division of plates 14, 15, and 16, Cortesian codex, relates to the Maya process of baking bread. Here we see a kind of oven or furnace (III, 3), through the lower portion of which the wood is thrust with which to fire it. On the ends of the pieces we see the symbol for *che*, "wood." As proof that there is an opening through the lower part of the oven to admit the wood, we have only to turn to page 16, where we have a view of it from another side (III, 4). On plates 14 and 15 the bakers are sitting by the ovens holding up their hands as though to partially ward off the heat. On 16 they sit with their backs against the oven, now cool, and hold in their hands the bread represented by the symbol seen in III, 4. Assuming this explanation to be in the main correct, the character shown in III, 5 may be appropriately rendered by some derivative of *kakamche* (*kaakanche*), *kaaktah*, *kaktah*, all of which refer to baking or roasting bread in a vessel of some kind. The glyph consists mainly of a repetition of Landa's *ca*. Possibly the signification may be found in the word *kakalkaktah*, which Perez interprets: "Asar retostando o bizcochando la cosa que quede muy seca."

Belonging to the last series is the character shown in figure III, 6, from Cort. 14a. This bears a strong resemblance to the *ahau* or

* Thomas: Study MS. Tro., 109.



/ symbol; nevertheless the heavy parallels and form of the lower part of the chief character leaves little doubt that it is the *p* or *pp* glyph. It is probable that the phonetic value of this character is *opp*, "cake, tortilla, biscuit," and with the numeral prefix signifies "5 cakes or tortillas." It is possible, however, that the circular dots on the sides of the parallels are intended to denote that the / sound is included, or, in other words, that in this instance the / and *pp* symbols are combined. III, 7, found in the same connection (which is a duplication of the first part of II, 5, and II, 10), interpreted *x'm*, may possibly be rendered correctly by *u-chamcham*, "a pie" or "meat pie;" or more likely *chamchamatal*, which, from Perez' somewhat confused definition, I understand to signify "to flatten in order to allow a better draft, as a pie or tortilla"—that is, that it may bake the sooner or more thoroughly.

Running through the lower and middle divisions of plates 61-63 of the Dresden codex is a chapter or series which, from the frequent representation of falling water and other indications, we may safely conclude relates, in part at least, to storms, rains, and tempests. As it consists of short columns of three compound characters, each with a date below, we presume that it is to be read by columns downward. Although most of the characters appear to be phonetic there are reasons for believing that some of them are mere symbols.

I have as yet succeeded in interpreting satisfactorily but few of the characters, as I have no way of testing the correctness of my conclusions save by a consistent rendering of two or more that follow in succession.

Pls. III, 8, 9, 10 (Dres. 72c), follow one another downward in the order given, the three forming one of the short columns above mentioned. From the lowest, waving blue lines, indicative of water, extend downward to the bottom of the division. The first (III, 8) appears to be wholly or in part symbolic, but this conclusion is reached with considerable doubt; the chief reasons for it being, first, the fact that the symbol, from the top of which extend dotted lines supposed to indicate raindrops or falling water, is turned upon its side as though representing a structure overturned by a storm; and, second, my inability to find any consistent phonetic equivalent for it. Nevertheless, it is possible it is phonetic, and that the dotted lines should be interpreted *ha* or *haa*, "water, rain, shower" (compare II, 13), and the main character by *san* (*sanah*), "to ruin, devastate." Although this will be consistent with the

definitions I have given these characters in other combinations, the fact that the glyph is turned upon its side seems to imply that it is intended to refer to the overturning of an edifice. As will be seen when I refer to III, 12, I take this also to be a glyph referring to a dwelling.

The character shown in III, 9, I render by the Maya word *chaac*, or *chac*, "the tempest or tornado," because the head is like that of the *chac* figures found in this and the Troano codices,* and certain marks in it appear to give some of the phonetic elements in this word. The animal eye is replaced in this by a circlet of little blocks similar to that found in the symbol for the day *Chicchan* as most usually given in the codices (Pl. III, 11). The cross in the appendage is doubtless phonetic, having (*k* or *c* hard) as its phonetic value. The dog or animal head as a whole is doubtless given as a determinative to show the reference to the storm or rain. The little figure in front of the eye of the animal head should, as seen in the same character elsewhere, represent a rod passing through a little circle; it is probably a lightning symbol. In the remarkable figure, Tro. 25b, which appears to be a symbolic representation of a storm, we see a line like that shown in III, 15, extending outward from the eye, probably indicative of the lightning flash. The chief character of III, 10, is the same as the symbol for the day *Ik*. The whole symbol may therefore be rendered *u-ik* or *u-ikal-ha*, "the wind," or "wind and water," the little hooks below the character having the signification *ha*, water. Connected with the time symbols below, the column may be interpreted as follows: "At this time occurred a tempest of wind and water which overturned and ruined dwellings," with allusion to dwellings of a particular class, as there appear to be differences in the glyphs of this series which seem to be used to denote houses.

As tending to confirm this statement, we refer to a column in Dres. 71b, shown in Pl. III, 12, 13, 14, reading downward in the order given. The character shown in III, 12 I believe to be the symbol of a dwelling, the dotted lines, as before, indicating the rain-storm. In this case the lower character is phonetic, signifying *cab*, "earth or ground," and indicating that the dwelling or dwellings referred to in this instance were placed on the ground. We also notice that the interlacing lines in the house symbol are differ-

* Dres., pls. 25, 26, 27, and 28a; Tro. 26, 27.

ent from those shown in III, 8. If I am correct in the supposition that these are house symbols, it is apparent that the differences between the glyphs indicate differences in the character of the buildings. As that which is shown in III, 12, is not turned upon its side, we may suppose it was not overturned by the storm. Landa alludes to an instance of this kind where the elevated and more imposing dwellings were destroyed, while the little cabins of the newly married persons, erected near the dwelling of the father or father-in-law of the husband, escaped destruction. It is possible that Landa obtained this historical account from the very record we are now considering, for the characters III, 13 and 14, if interpreted according to the phonetic value given the parts, furnish at least a slight foundation for this surmise. The parts of III, 13, give as the chief phonetic elements *y' mu', um'* or *y' mo'-c'*. As *mukumuc* (*mucumuc*) signifies, according to Henderson, "residence, abiding place, secure abode," referring, no doubt, to its subordinate and private condition, we may interpret the whole character by *yax-mucumuc*, "the new residence." Pl. III, 14, appears to be appropriately rendered by *yaxichamcal*, "married for the first time."

For a similar interpretation of the *y* character we refer to the symbol for the month *Yaxkin* (Pl. I, 12). Compare also the rendering of the appendix to III, 13, with that of the appendix to I, 23.

As there are no figures below the text in this case to aid in testing interpretations, we must be guided chiefly by the phonetic value of the characters obtained from other combinations. The interpretation given the middle and lower characters of these two columns will, as a matter of course, be more or less influenced by the conclusion reached in regard to what I have termed the "house" symbol. Nevertheless, regardless of this, the rendering of III, 9 and 10, is without doubt substantially correct, and the signification given III, 13 and 14, is consistent with the phonetic value of the parts.

As tending to confirm the rendering of III, 13, the symbol for the month *Moan* or *Muan*, as found in Dres. 46c, is given in III, 16. The chief character here is the same as the upper dot-surrounded character in III, 13.

Pl. III, 17, is from Tro. 33*b, where a savage-looking insect is figured below. As the chief character is precisely of the form sometimes given to the symbol for the day *Ix* in this codex, as III, 18 (from 5*c), and the suffix is Landa's *ca*, I translate the whole glyph

u-xacalbe, "the beetle or grub," as given by Henderson. The change of *ix* to *x* is frequent in the Maya language. For example, Perez gives *ixcucluumta* and *xcuclim* as Maya words for beetle (escarabajo). In each of the groups forming the series on Tro. 33**b*, here referred to, is found the character shown in III, 19, once with and once without the suffix. Although imperfect, this is evidently our *ch'* character shown in II, 34, 36, and III, 14. We interpret it by *chi* (*chinahi*), "to bite, nip, prick, sting, as an insect." Pl. III, 20, same group, may be rendered by *nach* (*nachah*), "to grasp, to seize with the teeth or mouth." This character bears a close resemblance to some forms of the symbol for *chicchan*, in the latter part of which word we find the same phonetic elements as in the word above given, though reversed. By reference to Tro. 20**c*, the so-called baptismal scene, we find the same character repeated three times in the text. As the scene probably represents mothers bathing or washing children, *nachin* or *naachin*, "beloved or loving mother," appears to be an appropriate as well as consistent rendering.

In Pl. III, 21 (from Tro. 29b and Cort. 26b), we have again the cross-hatching seen in I, 18, and II, 41, which appears to have *x* (*sh*) or *ch* (soft) as the chief phonetic element. Although the following may not be an exact rendering of the glyph, it may suggest the idea intended to be conveyed: *xaaxab*, "separate the plants in the seed-bed; transplant;" also, "having or that which has numerous forks." The figures below the text in Tro. represent Tlaloc (?), planting, replanting, or cultivating maize, which it appears the birds and animals are destroying. Those in Cort. show individuals setting up posts, each with a fork or crotch at the top. However, *u* may be the vowel, giving us *xuncul*, "having the point buried;" also, "to be seeded or planted," the former appropriate to the figures on the Cortesian codex and the latter to those in Troano.

Pl. III, 22 (Cort. 40b) we translate *halchahal*, "draw out of the pot the food, or that which is to be eaten;" also, "to disinter from the grave." The appropriateness of the first definition to what is shown by the picture below the text is apparent.

I am inclined to believe that the character shown in III, 23 (from Cort. 33b), refers to the eclipse of the sun. *Chibakin*, which appears to be a consistent rendering according to the phonetic value given the parts, signifies, as given by Perez, "eclipse of the sun; spot or mole on the body." Henderson gives *chibalkin*, "eclipse of the

sun." The figure below the text, which shows the sun in the heavens surrounded by clouds, while the great plumed serpent is in the act of swallowing it, and the Death God or God of the Under-world lies below on a bone, when examined in the light of this suggestion, is found to have a significance which would otherwise not be apparent. Pl. III, 24, which is one of the characters of the same group, contains as its chief phonetic elements *x'* or *ch'*, *s'* or *z'*, and *'c'*. As there are several Maya words which supply these elements, more than one of which may be applicable, we are unable without other aid to decide which one is the true equivalent. However, some of these are given as merely suggestive. *Xupzah*, "to waste away, to finish, to come to an end, to consume;" *xulzah*, "to come to an end." Possibly the suffix given the phonetic value *c'*, *ic*, or *ci* may be often used as a determinative.

Pl. III, 25 (from Tro. 7*c), relates apparently to the bee-house or structure figured below the text. As the lower and main character in the right portion has, according to our interpretation of Pl. II, 38, 40, 42, and 43, the phonetic value of *ch'*, usually with *o* or *u* as the accompanying vowel, it is probable that this right portion of the glyph should be translated *otoch*, "house." However, we have no guide in determining the value of the upper character, or even to assure us that it is phonetic. It is possible that it is a determinative to denote a building or structure. This seems probable from the fact that we find it used in several places where the reference is to a building or structure of some kind. For example, it is seen in III, 26, from Tro. 10*c, where a bee-house is figured below the text. Here it is joined to a different symbol from that with which it is connected in III, 25. It also appears in connection with the latter symbol in several places in the Dresden and Cortesian codices where the reference is to buildings, but the upper half is more reticulated than in III, 25, yet evidently has the same signification. It is possible that when connected with or forming part of a house symbol it refers to the thatched roofing. Possibly it may be phonetic, with *x* or *ch* as a prominent element.

The fact that the lower part of III, 26, is found in several places where it can have no reference to a building makes it evident that it has more than one signification and is most likely phonetic. As it has the two heavy lines indicative of the *p* sound, it is probable that the signification, where a structure is referred to, is *pak* (*paka!*), "a building, wall, fortification." Pl. III, 27 (from Tro. 17b), is

substantially the same character as that just referred to. It is found twice in this division; once over an individual tying a deer, where it may be rendered consistently by *pacoc* (*paccah*), "to cord, fasten, bind," or some derivative thereof (H.). However, an entirely satisfactory definition cannot be given until the signification of the prefix has been ascertained. Nevertheless, it is evident that *p'k* or *p'c* are its chief phonetic elements.

Our next example is the leading character (III, 28) from the so-called "baptismal scene" (Tro. 20c) above referred to. As it is composed of the upper character of the symbol for *Chikin* and Landa's *h* and *i*, the signification may be as heretofore suggested,* *chic-ha-ich* or *i*, "to rinse, cleanse, or wash with water the child or face." Or it may be, as is more likely, *yichintah*, "to bathe or wash another," the suffix indicating the child. The action appears to be repeated four times, once toward or in regard to each of the cardinal points, a symbol for one of these points appearing in each group. The cardinal point symbol shown in III, 29, is peculiar; no explanation, however, will be attempted at present.

As I have space for but few more examples of interpretation I give them with very brief comments.

Pl. III, 30 (from Tro. 23*a), *mamac*, "the warp of the loom," or "colored chain from the loom." The figure below the text is one of a series apparently representing pillage, and the article this fleeing personage has in his hand is probably the unfinished cloth he has stolen from a primitive loom.

Pl. III, 31 (from Tro. 25b) should, if the interpretations of II, 17, and II, 34, be correct, have *p* and *ch* as its chief phonetic elements. Although not meeting the requirements in one minor respect, *picit*, *pictah* or *piciyah*, "to move the air, to fan; to make wind with a fan," would seem to be an appropriate rendering if the implement which the individual figured below the text holds in his hand be taken for a fan.

Pl. III, 32 (from Tro. 33*c), I translate *xan-tzootz*, an abbreviation of *xanab-tzootz*, "a foot covering, shoe, or moccasin made of hair, moss, or vegetable fiber." The dark object in the hand of the individual figured below the text may be intended for a shoe or moccasin, though without the help of this explanation we would never have suspected it.

The translation of the preceding glyph will help us to an interpretation of III, 33 (from Tro. 17b), the phonetic value of which we take to be *tzabcan*, "the rattlesnake." It is possible, however, that the phonetic value contains the elements of *chom* (see similar glyph, Dres. 17b). It is only necessary to look at the figure below the text to see the object named. By reference to Landa's symbol for the month *Tzoz* (*tzotz* or *zoz*) the reader will see where the suggestion was obtained which led to the interpretation of the two last-mentioned characters.

Pl. III, 34 (from Tro. 13*c), *esyah*, "to make play with the hands in enchantment." Pl. III, 35, same division, *kinyah*, "to divine or work enchantment; to doctor with enchantments;" also "the priest of the idols." As these are found in the section of the codex relating to the making of idols, in which there is much ceremony, the definitions given would appear to be appropriate. It is also consistent with the phonetic value assigned the parts. See II, 39, and III, 24, for first part, and II, 38, and III, 22, for the suffix. In II, 31, however, it seems to be best rendered by *yok*; at the commencement of a word it is in some cases, if not usually, *ha* or *ah*. Following this suggestion, we translate III, 36 (from Tro. 13*d), by *u-ahmen*, "the wise man, artisan, official, mechanic," etc., which is also consistent with the general tenor of the section and gives the *men* symbol its proper value.

Pl. III, 37; frequent in all the codices, = *kal* or twenty. This is found in the numeral series and its signification admitted.

Pl. III, 38 (Tro. 12*d), *xacin*, "reptile."

The characters shown in III, 39, and III, 40, from Cort. 26c, which I have elsewhere* translated *yalcab* *kalcab*, "gather the swarm of bees and inclose them in a hive," may possibly have a very different meaning. The Maya word *yalcab* used here is found in the Perez calendar given by Stephens in the appendix to the first volume of his "Travels in Yucatan;" thus, *yalcab u kak ahtoc*, "the burner gives the fire scope." In this it is translated "to give scope." It is a verb of the fourth conjugation, sometimes spelled *yaalcab*, signifying "to give scope or run, to flow, emanate." Although the next character has the sound of *k* and *c* (*kalcab*), we can scarcely suppose that the two words have been abbreviated to *kak*.

In closing, I again express the hope that students devoting atten-

* *Science*, July 22, 1892.

tion to this subject will use what is here presented as a basis for further efforts in the same direction. Though a considerable portion of my interpretations may not sustain the test of rigorous examination or the results of future discoveries, yet I feel assured that further investigation and study will show that I am moving in the proper direction, and that light is at last breaking in upon these mysterious records

FOLK-LORE PUBLICATION.—The American Folk-Lore Society is devising means for the publication of a series of Memoirs, uniform in size and style with the *Journal of American Folk-Lore*. Among works already in hand or immediately available are: Angola Folk-Tales, by Heli Chatelain, the well-known Africanist and author of a Kimbudu grammar; Louisiana Folk-Tales, by Prof. Alcée Fortier, of Tulane University, New Orleans; Animal Tales of American Negroes, by Prof. A. Gerber, of Earlham College, Richmond, Ind., who has made a comparative examination of the so-called "Uncle Remus" tales to the animal tales of other countries; Current Superstitions among the English-speaking Population, by Fanny D. Bergen, of Cambridge, Mass., and a Miracle Play of the Rio Grande, by Captain John G. Bourke, U. S. A.

It is hoped that the Society may succeed in obtaining a fund sufficiently large for the publication in the near future of at least a part of the valuable material at its command.

FOLK-LORE CONGRESS.—The final program of the World's Folk-Lore Congress to convene in Chicago during the week commencing July 10th has been announced. The subjects are classed under (A) myths and traditional beliefs, comprising twenty-three titles; (B) oral literature and folk-music, of which there are seventeen; (C) customs, institutions, and rituals, twenty-five, and (D) artistic, symbolic, and economic folk-lore, numbering five papers. There will also be given during the Congress a folk-song concert of popular songs, sung by natives of various countries, under the direction of Mr. F. W. Root. The fact that the names of the world's leading folk-loreists are associated with such a large body of material of more than usual interest and value foretells the success of the Congress.